

HINTS AND TIPS
FOR THE

ROYAL ENFIELD
MADE LIKE A GUN

4.88 H.P. FOUR-SPEED
MOTOR CYCLE.



Hints and Tips

for the



4.88 h.p. Four-speed
MOTOR CYCLE.

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Hints and Tips for the 4.88 h.p.

Royal Enfield Motor Cycle.

- 1 The Royal Enfield Motor Cycle represents the applied knowledge of many years' experience in the manufacture of motor cycles for solo and side-car work, and embodies all that is best in design and construction. The many patented and registered features give this model an individuality possessed by no other side-car combination, and these features, together with the sound engineering practice introduced throughout the general construction, are responsible for that high measure of satisfaction which the Royal Enfield owner invariably derives from his machine.
- 2 The Royal Enfield 4.88 h.p. Motor Cycle has been designed and built to meet the demand for a dual-purpose machine of the simplest type, yet possessed of ample power and speed. Its small size and low weight make it a delightful solo machine, while the 488 c.c. engine provides ample power to pull a medium-weight sidecar and passenger on all conditions of roads. The four-speed gearbox enables the ideal gear to be used in all circumstances.

OPERATION OF THE 4.88 H.P. MOTOR CYCLE

- 3 **To Start up Engine.** Fill up with petrol and oil. As all machines are sent out without oil in the crankcase, it is necessary to replenish. Four charges of oil from the hand pump (see paragraph 7) should be put into the engine. Turn on the oil to the mechanical pump. Turn on the petrol and depress "tickler" of the carburettor once or twice. Place the gear control lever in the neutral position, close the air lever (top right hand), open the throttle lever (lower right hand) about one quarter, raise the exhaust valve lifter, and smartly depress the kick starter, allowing the exhaust valve to drop about half way down the stroke of the kick starter lever. If the engine fails to fire first or second time, repeat with a slightly different throttle opening. The best position of the throttle lever for starting will soon be found from experience. When the engine is running partially open the air lever.

The ignition lever should be slightly retarded for starting.

- 4 **To Start the Machine.** Pull up the clutch lever, and move the gear control lever into low gear position, *i.e.*, right back. Slowly release the clutch lever, at the same time accelerate the engine by opening the throttle slightly, and the machine will move away without any jar or jerk. When the machine has attained sufficient speed, momentarily release the clutch, and move the gear lever into second gear position. Repeat the operation into third and again into top gear when the machine has gained sufficient speed. Having attained speed, the air lever should be fully opened, and the ignition fully advanced. The carburettor is semi-automatic, and there are only three positions for the air lever, *i.e.*, fully closed when starting up, slightly open when running slowly on full throttle up a hill, and fully open for other speeds. Always start away in low gear. Use the clutch for starting and gear changing only. Do not slip the clutch on hills to save changing gear; as soon as the engine shows the least sign of labouring, a lower gear should be engaged. To come to a standstill, throttle down, disengage the clutch, and apply the brakes. The engine need not be stopped in traffic, but the low gear should always be engaged after stopping ready to accelerate when occasion affords.

LUBRICATION

- 5 **Lubrication of the Engine.** We advise the use of Wakefield's "Castrol (XL)" Oil as being the most suitable for Royal Enfield engines, but whatever oil is used, buy it in a sealed can, and do not allow your tank to be filled up from an open tin or drum.

All Royal Enfield 4.88 h.p. motor cycle engines are fitted with aluminium alloy pistons, and the engines require special attention until they have become properly "run in." A new machine should not be driven at a speed exceeding 25 m.p.h. for the first 200 miles; at the same time it should be freely lubricated. If in doubt at any time as to whether the engine requires more oil, give the engine the benefit of the doubt. The worst that can happen is an oiled plug and a smoky exhaust, whereas the consequences of insufficient oil are far more serious.

Stale oil should be drained from the crankcase after approximately every 1,000 miles, and the engine should occasionally be flushed out with paraffin oil. The engine is drained by removing the plug at the base of the crankcase. On replacing the plug the engine should again be charged with oil from the hand pump. The draining of the crankcase is more easily done at the conclusion of a ride, when the oil inside the crankcase is warm, and consequently flows more readily.

- 6 **Mechanical Oil Pump.** The Oil Pump (Patent No. 162123/21), fitted to Royal Enfield engines supplies a continuous and certain supply of oil to the engine, varying in amount according to the speed at which the machine is running.

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The pump consists of an oscillating plunger driven by a spiral gear from the timing wheel shaft. The supply of oil from the pump is fixed at the Works, and cannot be varied. In the case of each engine, the supply is sufficient to keep the engine properly lubricated at normal speeds, but when conditions prevail calling for greater power from the engine, as when ascending long hills, or travelling at high speeds, the automatic lubrication should be supplemented by an occasional pumpful of oil from the auxiliary hand pump in the tank.

A fine mesh gauze is fitted in the tank to prevent foreign matter getting into the supply pipe or into the mechanical pump, so that there is no likelihood whatever of the supply of oil from the mechanical pump being interrupted, and the pump should not be interfered with unless the engine is being dismantled.

- 7 **Hand Pump.** The supply of oil from the hand pump in the tank is shut off by a tap below the tank, and this tap should always be closed to prevent oil leaking into the crankcase when the pump is not in use. To inject oil into the engine, turn on the tap and unscrew the plunger. The latter should then be slowly drawn upwards, pressed steadily down and screwed home. The tap should then again be closed.
- 8 **Lubrication of the Gear Box.** The gear box is charged with lubricant before leaving the Works, and will not require attention for at least 1,000 miles. After that it should be occasionally re-filled up to the level of the plug placed in the side of the gear box for the purpose. "Castrol" grease or thick engine oil is suitable.
- 9 **Lubrication of Chains.** The front chain receives a certain amount of lubrication from the crankcase breather, but this should be supplemented occasionally by smearing with engine oil or Price's "Rangraphine." The rear chain should be constantly lubricated with engine oil or "Rangraphine," and should occasionally be removed, and after being washed in paraffin, be soaked in melted tallow.
- 10 **Lubrication of Bicycle Parts.** Bicycle bearings, particularly the hubs, fork joints, and steering head should be greased regularly, with the grease gun provided, and at the same time it is a good practice to go over all nuts, and see that they are tight.

ENGINE TROUBLES

- 11 **Engine Misfiring due to faulty Sparking Plug.** Engine misfiring at slow speeds is frequently an indication that the points of the plug are too close to the central electrode. The platinum points of the magneto should also be examined and cleaned. See that the points are not more than $\frac{1}{2}$ mm. apart when fully open.

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Engine misfiring is sometimes caused by dirt having reached the collector brush at the back of the contact breaker of the magneto. This can be remedied by removing the contact breaker and washing it in petrol. Allow petrol to evaporate before re-starting engine. To remove contact breaker, unscrew hexagon-headed bolt in centre by means of the magneto spanner provided and pull the contact breaker off bodily. This does not in any way interfere with the timing of the magneto. When replacing this be careful to place the key in the slot, replace the bolt and tighten up. Engine misfiring at slow speeds is sometimes due to weak valve springs.

- 12 **Engine Misfiring due to faulty Carburettor.** Irregular firing of the engine may be caused by water having entered the carburettor. Disconnect the petrol pipe from the filter, and unscrew the cap over the float chamber. The float and needle can then be removed, and the water cleaned out. The jet should always also be removed, and the water released therefrom. Misfiring may also be caused by a punctured carburettor float, thus causing flooding, and rendering mixture too rich.

Full particulars of carburettors fitted to Royal Enfield machines are given in booklets issued by the makers, copies of which we can supply on request.

A petrol filter is fitted to all Royal Enfield machines, immediately below the tank. This may occasionally be choked with foreign matter, but can readily be taken to pieces, and the gauze cleaned.

- 13 **Engine Knocking.** Should the engine knock after slowing down for corners, at once partly close the air lever and retard the ignition. This knocking is due either to a poor mixture, too high a gear or excessive carbon deposit on cylinder head and piston.

Overheating. One of the pronounced symptoms of overheating is that the engine calls for an undue amount of oil. This overheating may be due to one or more of the following causes :—

- Carbon deposit on cylinder head and piston.
- Wrong valve timing.
- Choked exhaust.
- Wrong kind of oil.
- Too high a gear.
- Too rich a mixture.
- Ignition retarded.
- Tightness of working parts in the engine.
- Overdriving the machine for long distances on too low a gear, etc.

OVERHAULING THE ENGINE.

- 14 **Cylinders and Pistons.** When an engine has been in use for a certain time, carbon deposit forms on the piston and cylinder head, and the cylinders should be removed every 2,000—3,000 miles, the carbon deposit scraped off, and the valves re-ground.

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In this machine a large engine is fitted into a frame combining a neat and compact appearance with ample ground clearance. To remove the cylinder, therefore, the tank must first be taken out of the frame. This sounds a lengthy proceeding, but if the work is carried out systematically, no difficulty will be experienced.

First, undo the two bolts holding the gear quadrant on to the tank tubes and remove the quadrant complete. Remove the plunger of the hand pump, and the six tank support bolts. Withdraw the bolt holding the front of the tank tubes, slacken the rear bolt, and drop the front end of the tubes. The tank can now be withdrawn. It is not necessary to empty the petrol away or remove the petrol tap and filter, as these can be threaded through the frame quite easily. Having removed the tank, raise the front end of the tank tubes and remove the valve caps, sparking plug, carburettor and exhaust pipe. After undoing the four cylinder holding down nuts, lift the cylinder clear of the studs, incline it slightly forwards and with the piston nearly at the bottom of its stroke the cylinder can be lifted clear.

Every care should be taken not to damage the surfaces of either cylinder or crankcase, otherwise, after re-assembling, trouble will be experienced with oil leaking through the joint.

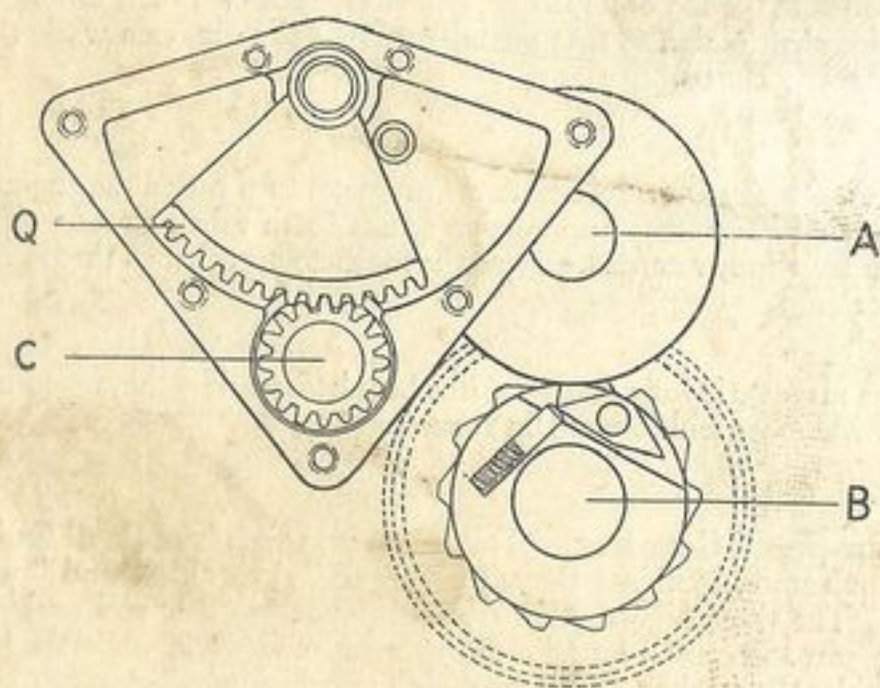
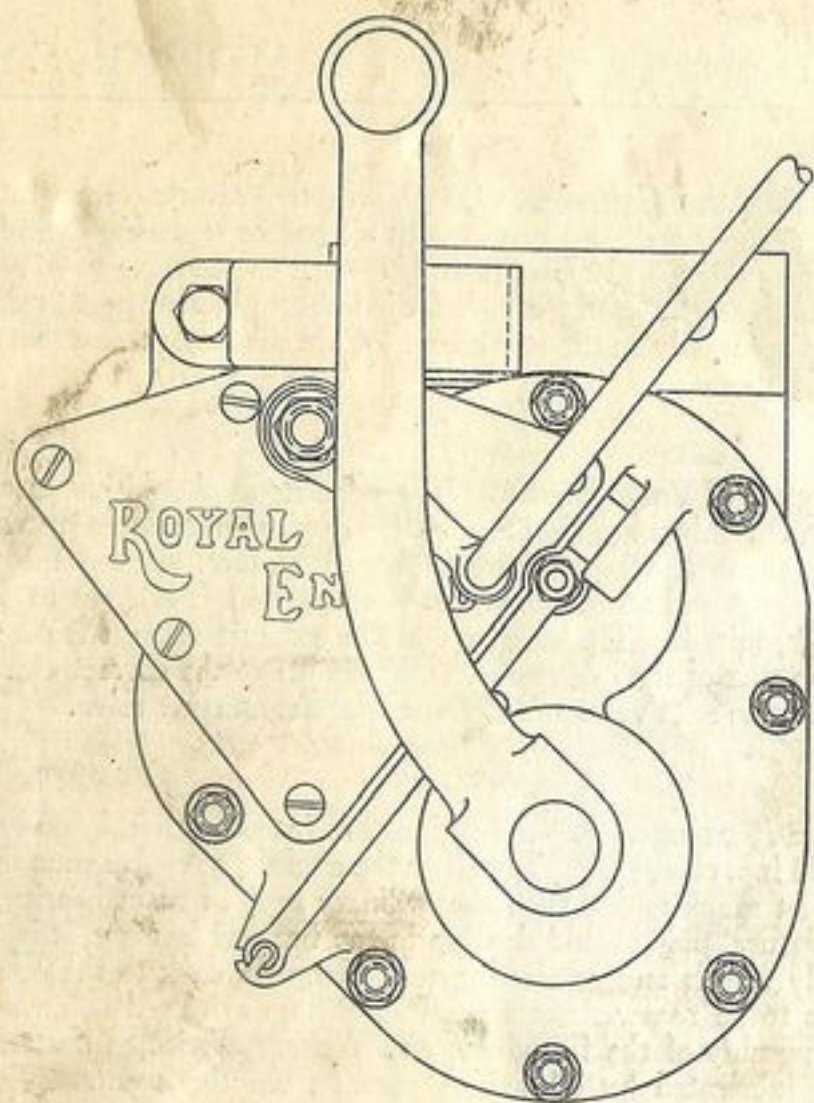
The carbon deposit is most readily removed from the cylinder head by scraping it with a long-handled screw-driver, but great care should be taken not to damage the walls of the cylinder. Deposit should also be scraped off the top of the piston and removed from the back of the piston rings.

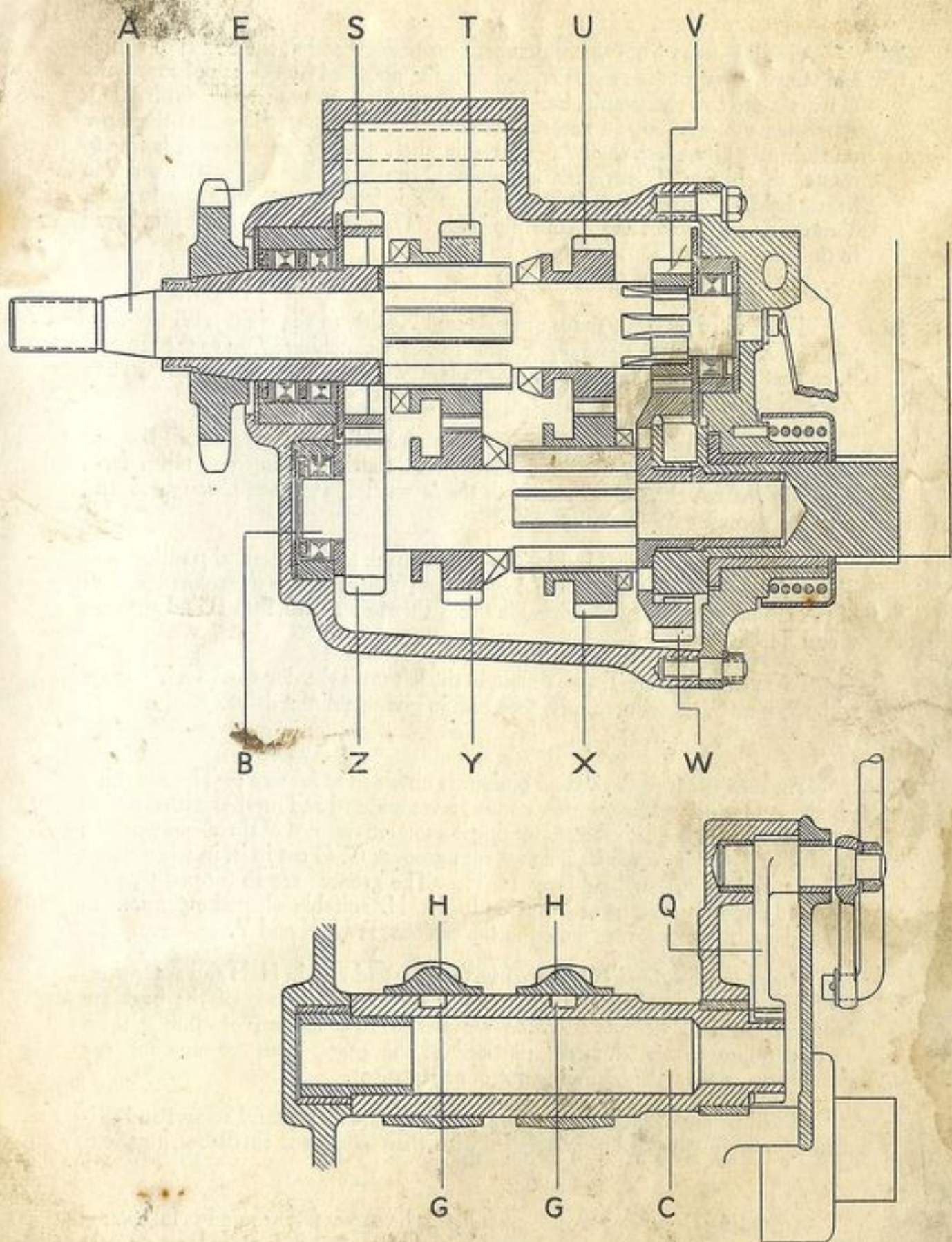
15 Grinding in Valves. Valves should only be ground in when the cylinder is removed from the engine, so as to avoid any possibility of the grinding compound getting into the engine. A valve can readily be removed by placing a suitable article under the head of the valve to prevent it from moving, compressing the valve spring, and taking out the cotter beneath the lower valve spring cap, when the spring will come away, and the valve can be lifted out. Having removed the valve, scrape off all carbon deposit, smear the seat with a little grinding compound or fine emery and oil. Replace the valve in position, and rotate it with a screw-driver, occasionally lifting the valve off its seat, until a bright ring is obtained on the face of the valve, and also on the seating. Before replacing the valve be perfectly sure that all trace of grinding compound or emery has been thoroughly washed out of the cylinder.

16 Piston Rings. When removing or replacing piston rings, great care must be taken not to overstrain them when they are being removed from their grooves. It is a good practice to place three thin strips of metal at the back of the piston ring, which will enable you to slide it off the piston without damage. After a considerable mileage, the rings will probably show a certain amount of vertical play in their grooves, and in consequence there will be a poor compression in the engine. In such cases new rings should be fitted.

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- 17 **Replacing the Cylinder.** Do this in the reverse order to taking off. Smear the cylinder wall and piston with oil before replacing cylinder. When screwing down the cylinder base nuts, give each a successive turn, otherwise, by screwing one home by itself the cylinder is liable to be damaged or distorted and will not bed accurately on the crankcase. Care should be taken that all parts are scrupulously clean.
- 18 **Clearance of Valve Stems.** The valve stems should just clear the tappet heads when the valves are closed. If there is an appreciable distance between them or the stems and tappets are in actual contact, slacken the nut on the adjustable tappet and screw the tappet head to the left or right to lengthen or shorten, as required. The clearance of the exhaust valve should be slightly greater than that of the inlet valve. As a guide to the correct clearance, allow .004 inch for the inlet valve and .008 inch for the exhaust valve.
- 19 **Engine Bearings.** Roller bearings are fitted to the big end of all Royal Enfield 4.88 h.p. engines. They allow the engine to revolve much more freely, and they last much longer than the ordinary type of plain bearing. If, after considerable use, play should develop in the big end bearing, it is advisable to send the fly wheels and connecting rods complete back to the Works, for the worn parts to be renewed, as special appliances are used to ensure the most accurate assembly of the fly wheels and shafts. The cam shaft bearings are adequately lubricated by oil, which passes from the crankcase, through the breathers, into the timing gear case.
- 20 **Engine Timing.** To re-time the cam shaft turn round the engine until the piston is at the top of its stroke, and engage the cam shaft timing wheel with the engine shaft pinion so that the inlet valve is slightly open while the exhaust valve is nearly closed.
- 21 **Magneto Timing.** To time the magneto, turn round the engine until the piston is at the top of its compression stroke (both valves closed), and with the magneto lever fully retarded, engage the magneto sprocket so that the points are just breaking.
- The magneto is fully described in a booklet issued by the manufacturers, a copy of which we will forward on request.
- 22 **Four-Speed Gear Box.** This gear box, which is of Royal Enfield design and manufacture, combines the advantages of "close ratio" and "wide ratio" boxes. The three higher gears are fairly close together and enable the most suitable gear to be used for all ordinary main road work, while the low bottom gear enables the machine to climb any hill on which wheel-grip can be obtained





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23 As will be seen from the illustrations on pages 8 and 9, the box is of simple and sturdy construction, the four speeds being obtained by the use of four pairs of wheels and two shafts only, besides the cam shaft C and operating quadrant Q. As shown the gears are in neutral position. The clutch is keyed to the taper on the end of the main shaft A. On this shaft the pinion sleeve S is free to rotate, the pinion T can slide endways, U can both slide and rotate, and V is firmly held. On the layshaft B the pinion W is free to rotate, X is free to slide, Y can slide and rotate, and Z is firmly held. The rear chain sprocket E is keyed to the pinion sleeve S.

24 To obtain first gear, the pinions U and X slide to the right until the dog-teeth on X engage with those on W, thus in effect clutching W on to the layshaft B, so that the drive is taken from A through V and W to B, and then through Z and S to the sprocket E.

To obtain second gear, the pinions U and X slide to the left until the dog-teeth on U engage with the splined portion of A, the drive being now taken from the main shaft A through U and X to the layshaft B and then through Z and S to the sprocket E.

To obtain third gear, U and X are moved back to their neutral position, and T and Y slide to the right until the dog-teeth on Y engage with the splined portion of the layshaft B, so that the drive is taken through T and Y to B and through Z and S to E.

To obtain top gear, T and Y slide to the left until the dog-teeth on T engage with those on S, thus clutching S to A and so giving a direct drive.

25 The movement of the sliding pinions is obtained as follows :—The operating quadrant Q is moved by the gear control lever and rod and meshes with a pinion cut on the end of the cam shaft C, giving it a total movement of three-quarters of a revolution. This cam shaft has two cam grooves G, G cut in it, in which work pegs carried on the striking arms H, H. The grooves are so formed that the required endways movement is given to H, H, suitable shaped extensions to which bear in the grooves formed in the pinions T, U, X and Y.

The pegs operating in G, G are free to move endways in H, H and are spring-loaded so as always to bear on the bottom of G, G. The ends of the pegs are rounded off and fit into suitable recesses in the bottom of the grooves corresponding to the different portions of the gears, thus eliminating any possibility of the gears jumping out of engagement.

It will be seen that the operating mechanism is simple and robust and dispenses entirely with levers or toggles with their attendant small bearings, etc.

26 **Adjusting Gear Control.** Should this be necessary, proceed as follows:—Place rear wheel on stand, disconnect top end of control rod, place lever on gear box in neutral position (between first and second gears), place gear control

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lever in neutral notch and lengthen or shorten control rod by loosening the lock nut and turning the top forked end. Connect up to control lever and tighten lock nut.

- 27 **Clutch.** The clutch is of the dry plate type and requires no lubrication. It is operated by a push rod, running through the hollow main shaft of the gear box, and a long external lever. Should the clutch slip, see that there is a small clearance between the lever and the end of the rod when the clutch is engaged. An adjusting screw and lock nut are provided at this point.
- 28 **Expanding Hub Brakes.** All Royal Enfield expanding hub brakes are fitted with brake shoes lined with a compressed Asbestos fabric, which it will be found has long wearing qualities and will seldom require renewing. The rods to the rear brake are divided, and fitted with a nut having a right and left-hand thread, which enables the brake to be simply and quickly adjusted. Should an excess of oil find its way from the hub bearings on to the brake linings, the brake will lose a certain amount of its efficiency. In this case the shoes and linings should be taken out and washed in petrol to remove the oil.
- 29 **Patent Cush Drive Rear Hub.** All Royal Enfield Motor Cycles are fitted with Patent Cush Drive Rear Hub, which takes up the drive from the countershaft to the rear wheel with great flexibility and smoothness. This hub has a marked effect on the running of the machine, absorbing all engine shocks, and preventing any snatching of the driving chain, and consequently minimising the wear on the rear tyre. The drum on the driving side of the rear hub is provided with three metal vanes, and the inside of the driving sprocket has three similar vanes. On each side of the vanes in the hub is placed a block of solid rubber, and the vanes on the inside of the driving sprocket fit between these blocks. When in position there is a block of rubber and a metal vane alternately.
- This cush drive hub is so simple that adjustment is seldom necessary. The only parts likely to wear are the rubber blocks which, however, will last a considerable time.
- 30 **Wheel Bearings.** The bearings of both wheels are single row, deep groove journal races. These have been proved by extensive tests to be superior to cup and cone bearings, and are adequate to deal with both radial and thrust loads. They require no adjustment.
- 31 **Detachable Carrier and Rear Mudguard.** To facilitate tyre repairs, and the removal of the rear wheel, the carrier and rear mudguard of all Royal Enfield motor cycles are made quickly detachable. To do this slacken the two nuts on the rear fork ends, which retain the carrier supports, tap the carrier sharply upwards until the hooked ends of the carrier are disengaged from the sockets on the fork sides, and the whole assembly of carrier, mudguard and back stand clip may be lifted away.

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- 32 Adjustment of Chains.** The front chain is adjusted by moving the gear box backwards. To do this slacken the nuts which clamp the gear box between the extensions of the rear engine plates and move the gear box backwards. An adjuster is provided for this purpose.

On no account should a chain be run quite tight.

The rear chain is adjusted by slackening the wheel spindle nuts, and the nut retaining the expanding brake anchor arm. Then adjust the set pins in the rear fork ends, which vary the position of the wheel spindle.

- 33** After adjusting the rear chain, the rear brake operating rod will also require adjustment. Should it be necessary to remove either of the chains, it is important that, when replacing the connecting link, care should be taken that the spring fastening is so fitted that the split end is behind the direction in which the chain travels.

- 34 Front Forks.** Side play in the front fork links is taken up as follows :— Release the nuts on the fork spindles, and adjust with the squares provided on the end of the fork spindles. Each spindle is provided with a right and left-hand thread, which will open or close the fork links as required.

- 35 Ball Head.** All Royal Enfield motor cycles are designed with ball heads of ample dimensions, which will rarely require attention. If on inspection, however, it is found, when lifting at the handlebars, a small amount of play has developed, this should immediately be taken up. To adjust the ball head, release the pin through the ball head clip, and adjust the nut on the top of the steering stem, which holds the ball head clip in position, until all play has disappeared.

